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ABSTRACT

This paper presents an overview of information technology development. The first section sets the scene, comparing the first WAN (Wide Area Network) and Intel processor to current technology. The birth of the microcomputer is described in the second section, including historical background on semiconductors, microprocessors, and the microcomputer. The creation of the Internet from 1962 to 1998 is addressed in the third section. The next section outlines where we are today, including uses for the Internet. Issues to consider related to the Internet are summarized in the fifth section, and the sixth section suggests new Internet applications. A concluding section considers the future in regard to information technology development. (MES)

RIDING THE TECHNOLOGY WAVE

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1. Setting the scene

- In 1965 Thomas Merrill and Lawrence Roberts created the first WAN by connecting two computer like devices, TX-2 in Massachusetts to a Q32 in California, with a low speed dial-up telephone line. Today 33 years later we are all familiar with the Internet, a WAN interconnecting more than 30 Million computer devices world wide.

- It is estimated that the average GM car on the road today has more computing power than the vessel that made the first lunar landing in 1969. Then lets not even begin to contemplate the vast amounts of computing power on our desktops today.

- The first Intel processor in 1971 (The 4004) had a total of 2300 transistors in the chip. The current Pentium II processor from Intel has over 7,5 Million transistors and are believe to have increased 3200 times in 26 years. The speed of these processors has increased from ,108MHz to 300 MHz with the latest releases believed to be even faster.

2. The birth of the Microcomputer

2.1 Semiconductors

- In 1947 three scientists at Bell Telephone Laboratories, William Schockley, Walter Brattain and John Bardeen demonstrated their new invention the point-contact transistor amplifier. And in 1948 Bell labs filed for a patent on the first transistor.

- 1959, January and Texas Instruments announces the discovery of the integrated circuit

- Also in 1959 (July) and Fairchild Semiconductor files a patent application for the planar process for manufacturing transistors. The process makes commercial production of transistors possible and leads to Fairchild's introduction, in two years, of the first integrated circuit.

- Also at Fairchild Semiconductor, Robert Noyce constructs an integrated circuit on silicon with built-in metal, conductors, transistors, and resistors.

- And finally in 1964 Texas instruments received a patent on the integrated circuit.

2.2 Microprocessors

Definition:

A microprocessor is an integrated circuit built on a tiny piece of silicon. It contains thousands, or even millions, of transistors, which are interconnected via superfine traces of aluminum. The transistors work together to store and manipulate data so that the microprocessor can perform a wide variety of useful

functions. The particular functions a microprocessor performs are dictated by software.

Moore's Law

In 1965, Gordon Moore was preparing a speech and made a memorable observation. When he started to graph data about the growth in memory chip and Integrated circuit performance, he realized there was a striking trend. Each new chip contained roughly twice as much capacity as its predecessor, and each chip was released within 18-24 months of the previous chip. If this trend continued, he reasoned, computing power would rise exponentially over relatively brief periods of time.

Moore's observation, now known as Moore's Law, described a trend that has continued and is still remarkably accurate. It is the basis for many planners' performance forecasts. In 26 years the number of transistors on a chip has increased more than 3,200 times, from 2,300 on the 4004 in 1971 to 7.5 million on the Pentium® II processor.

2.3 The Microcomputer

It was in November 1971 when Intel introduces its 4-bit bus, 108-KHz 4004 chip - the first microprocessor. Initial Price was $200. Speed is 60 000 operations per second. It uses 2300 transistors, based on 10-micron technology. It can address 640 bytes. Documentation manuals were written by Adam Osborne. The die for the chip measures 3x4 mm. Intel announces the first microcomputer, the MCS-4 system. It uses the 4004 microprocessor, 4001 ROM chip, 4002 RAM chip, and 4003 shift register chip.

- In April 1974 Intel releases its 2-MHz 8080 chip, an 8-bit microprocessor. It can access 64KB of memory. It uses 6000 transistors, base on 6-micron technology. Speed is 0.64 MIPS.
- Despite being US$300,000 in debt, Ed Roberts is able to borrow an additional US$65,000 from the bank to complete work on what would be the Altair.
- Popular Electronics publishes an article by MITS announcing the Altair 8800 computer for US$439 in kit form. It uses the Intel 8080 processor.
- The Altair pictured on the cover of the magazine is actually a mock-up, as an actual computer was not available. Railway Express loses Ed Robert's only prototype Altair computer, en route to New York for review and photography for publishing by Popular Electronics.Les Solomon, publisher of Popular Electronics, receives Altair number 0001.
- The 12 year old daughter of Les Solomon, publisher of Popular Electronics, suggests the name "Altair" for Ed Robert's new microcomputer. Altair was the name of where Star Trek's Enterprise was going that night on TV
- In February 1975 Bill Gates and Paul Allen demonstrates their newly written BASIC interpreter for the Altair. The software was licensed that same month to MITS. This was the first computer language program written for a personal computer.
- Things then started to take off for MITS who announced in March 1975 at a microcomputer hobbyist club that they had already 4000 orders for the Altair. A Month later Gates founded Microsoft and MITS delivered their first generally available Altair 8800. In May 1977 a company called Pertec buys MITS and its Altair stock for over $ 6 Million.

The PC as we know it today:

Today 27 years later the PC as it is now known has become a tool without which basically no business can do without. And in contrast to earlier predictions has also become part of most households. Processing speeds are up to 300Mhz per device, the BASIC program is long forgotten and operating systems such as Windows NT and Windows 97 is now in the order of the day.

We have in a short period of time learned to become used to Processor speeds of up to 233 MHz, disks of up to 2 Gb, Memory of 32 Mb and more, CD-Rom drives, VGA monitors and Windows based applications. I often still wonder whether the development of new operating systems, which are more resource hungry, are not perhaps a conspiracy between hardware and software manufacturers to ensure their future business.

3. The creation of the Internet

While the above mind blowing developments have taken place networking of computing devices and the quest to create an internet like network has also been progressing at a rapid speed.

- In 1962 J.C.R Licklider discussed in a couple of papers what he called the "Galactic Network". He envisaged a globally interconnected set of networks through which everyone could quickly access data and programs from any site. In spirit this concept was very much like the Internet of today.
- In 1969, four host computers connected and ARPANET (Advanced Research Project Agency) was off the ground. Even at this early stage, networking research incorporated work on the underlying network and how to utilize the network. It is believed that the ARPANET grew into what is know as the Internet today built on the principle of open architecture networking.
- In the mid 1970's computer networks began to spring up wherever funding could be found for this purpose. So it happened that in 1981 BITNET (because its time network) was formed. Started as a cooperative network between the City University of New York with the first connection to Yale. It provided for electronic mail and listserv servers.
- Then in 1982, after TCP/IP (Transmission Control Program / Internet Protocol) was already adopted as a defense standard in 1980 it was adopted by ARPANET. With this smooth transition button were distributed saying "I survived the TCP/IP transition). Today this standard is widely implemented and part of most if not all computer communications systems.
- In 1992 the number of hosts connected to the Internet breaks the 1 Million barrier, and six years later in February 1998 the 30 Million barrier was broken showing the enormous growth of the Internet as we know it today. With the inception of the WWW in 1991 believed to be playing a mayor role.

4. Where we are today

- Host count: 30 Million
- Domains: 1.6 Million
- WWW Sites: 2.3 Million
- Users :who will ever know ?

4.1. Uses for the Internet

E- Mail
Listservs (User and discussion groups)
WWW
- Social and Entertainment
- Business, research and general information
- Accessing Online services and the Intranet

FTP and Telnet

5. Some Pressing issues

Although the Internet has evolved with such a rapid speed, and has become part of our daily lives and business we would have to be honest and, dare I say consider or at least ask some questions:

- Why are most publishers starting to make information (Journals and databases) available on the Internet ? Is it truly because they believe it is a better distribution medium or is it perhaps because the competition is likely to. Or perhaps because the users are asking for it?

- E-commerce is a big buzzword, banks are starting to go online, you can pay your home lone, transfer funds, check your financial portfolio. But still there is a long queue in the bank at the teller, not to mention at the ATM

- With so many electronic resources on the Internet, with e-mail such a powerful tool, not even to again mention the power of the applications on your desktop, how is your progress in moving towards the paperless office.

- Possibly one of the most welcome changes that has become part of our lives since the reality of the Internet is the office without walls, the home office and then the ability to take your office with you wherever you may go.

- Have us " Techno freaks " created the Internet and the rest of society is now trying to find applications for this creation in an effort to justify its existence.

6. Something New Perhaps ?

Riding the technology wave, makes me think of a surfer surfing a wave. He knows where he is heading (to the beach), he thinks he knows how to get there but he remains constantly aware that he or she may fall at any time. Lets look at the future and how we are progressing in reaching the beach, which I'm afraid might move away because of currents even though we think we are moving faster towards it.

New Application:

- Shopping, from groceries to cars to homes
- Online bookings and reservations
- Distance learning and conferencing
- Video over the Internet
- The Internet telephone
- Virtual libraries
- Vast amounts of Information and getting more
- 3 D on the WWW

New Technologies

Will your TV satellite (or perhaps cable TV node) decoder become your Internet link ?

7. The Future ?

- Is it perhaps true that the Internet and technology is starting to move faster than what we as humans, therefore social beings, can and are prepared to handle.

- Will the telecom providers of the world be able to sustain the ever increasing demand for bandwidth to be able to make the future applications a reality. Or will we again see incredible growth, perhaps this time in wireless communications such as Satellite and Cellular communications.

- Or will this explosion in technology perhaps again remind us of our need for human interaction and therefore strengthen services based on human interaction with a higher emphasis on customer

service.

- I personally believe that the future and outcome of riding the technology wave will depend on the same factor that keeps the surfer on his board till he reaches the beach, which is **balance**. If the Internet stumbles, it will not be because we lack for technology, vision, or motivation. **It will partly be because we cannot set a direction and march collectively into the future, but most importantly it will be because we were not able to set the balance between technology and its impact on the social needs of us as humans.**


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